



# **Opinion of Probable Construction Cost**

**Lynn Water and Sewer Commission  
West Lynn Sewer Separation  
Phase 4/5, 60% Design**

**July 30, 2019**

# Opinion of Probable Construction Cost

## Basis of Estimate Report

<b>Client:</b> Lynn Water/Sewer Commission	<b>Date Issued:</b> 30July2019
<b>Project Name:</b> West Lynn Sewer Separation	<b>Revision No.:</b> 1
<b>Project Contact:</b> E. Olander	<b>AACEI Class:</b> 3
<b>Design Definition:</b> 60% Design	<b>Currency:</b> USD

Prepared by: Stantec Estimating Date: 30-July-2019  
Lead Estimator

Reviewed by: Stantec Estimating Date: 30-July-2019  
QA/QC Reviewer

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

Accepted by: \_\_\_\_\_ Date: \_\_\_\_\_

*Any opinions of probable construction costs (OPCC) prepared by Stantec, including evaluations of the Client's project budget, and/or funding, represent Stantec's best judgment as a design professional familiar with the Construction industry. Unless and to the extent otherwise indicated by Stantec, such opinions or evaluations are based on upon current market rates for labor, material and equipment. The Client acknowledges that Stantec has no control over the costs of said labor, materials, or equipment, construction contractor's methods of determining bid prices, competitive bidding environments, unidentified field conditions, market conditions, hyper-inflationary or deflationary price cycles, or any other factors that may affect the OPCC, the project budget or negotiating conditions at the time of project execution. Client further acknowledges that the OPCC is a "snapshot" in time and that the reliability of the OPCC will degrade over time. Accordingly Stantec does not warrant or represent that construction bids or negotiated prices will not vary from the Client's project budget or Stantec's good faith OPCC.*

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Blue Text – Project Specific

Black Text – General Report

## 1 BASIS OF ESTIMATE

### 1.1 Introduction

The intent of this OPCC for the West Lynn Sewer Separation Project is to describe, in sufficient detail, the methodology, assumptions, exclusions, allowances, exceptions and any other information used to develop the estimate.

### 1.2 Project Scope

The project is located in Lynn, Massachusetts. The project scope of work includes:

#### Phase 4:

- New 12" to 72" Storm Drain Piping, New Manholes, Tie In to Existing
- Removal/Replacement/New Catch Basins
- New 8" to 15" Sanitary Sewer, New Manholes, Tie In to Existing, Service Reconnects
- New 8" to 14" Water Main Piping, Fittings, and Valves; Tie In to Existing, Service Reconnects
- CIPP of existing sewers
- Temporary Water during Construction
- Surface Removal and Restoration
- Material management and disposal

#### Phase 5:

- New 12" to 36" Storm Drain Piping, New Manholes, Tie In to Existing
- Removal/Replacement/New Catch Basins
- New 8" to 15" Sanitary Sewer, New Manholes, Tie In to Existing, Service Reconnects
- New 6" to 10" Water Main Piping, Fittings, and Valves; Tie In to Existing, Service Reconnects
- CIPP of existing sewers
- Temporary Water during Construction
- Surface Removal and Restoration
- Material management and disposal

### 1.3 Organization

The project is broken down into a work breakdown structure (WBS) as identified in the attached estimate summary.

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### 1.4 Class of Estimate

**The OPCC estimate is a Class 3 according to the Cost Estimate Classification System.**

A Cost Estimate Classification Matrix including Accuracy Ranges and Typical Contingencies along with detailed description of each Estimate Class can be found in the Attachments under Estimate Classification Matrix/Estimate Classification Descriptions.

**A 20% Contingency is included. No contingency applied to allowances.**

Contingency specifically includes:

- Errors and omissions in the estimating process
- Variability associated with the quantification effort
- Design that may not be complete enough to determine final quantities
- Some items that may define precise quantification but are required to be estimated
- Some items to be quantified that are generally computed by factoring
- Labor productivity variability
- Labor availability, skills, and productivity that may vary from that assumed
- Weather impact which may affect productivity
- Normal wage rate variability
- Composite wage rates varying from those assumed due to crew make-up, market conditions, and labor availability
- Material and equipment costs that may vary from those in the estimate due to inflationary reasons and market conditions.
- Changes in the actual quantities that may change schedules from that assumed in the estimate.

Contingency specifically excludes:

- Significant changes in scope
- Major unexpected work stoppages (strikes, etc.)
- Disasters (hurricanes, tornados, etc.)
- Excessive, unexpected inflation
- Excessive, unexpected currency fluctuations

### 1.5 Reference Documents

The following reference documents serve as the estimating basis:

No.	Date	Description
1	July 2019	60% Design Drawings
2	July 2019	60% Design Specifications

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### 1.6 Estimating Team

The estimating team is made up of the following individuals:

Name	Role and Responsibility
Estimating	QA / QC Reviewer
Estimating	Estimators

### 1.7 Labor Assumptions

The following labor assumptions are incorporated into the OPCC:

Parameter	OPCC Assumption
Local Wage Determination	2019 Essex County MA
Productivity Adjustment to U.S.	None
Shift Basis   Shifts/Day   Days/Week	8 hrs   1 Shifts/day   Minimal overtime allowance included
Living Per diems or Camp Costs	None
FICA   SUI   Workers Compensation	Included in hourly rate

### 1.8 Equipment Assumptions

The following equipment assumptions are incorporated into the OPCC:

Parameter	OPCC Assumption
Equipment Rate Basis	Essex County MA ave. rates
Rate Adjustment to U.S. Avg.	None
Fuel Rates : Gasoline   Diesel Compensation	\$3.50/Gal.   \$3.20/Gal.

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### 1.9 Escalation

Estimated costs reflect current price levels consistent with the OPCC publish date. Escalation to the mid-point of construction **has been** added to the OPCC.

### 1.10 Assumptions

The following assumptions are incorporated into the OPCC:

#### Project specific assumptions/comments/clarifications:

##### General:

- No “Market Conditions” adjustment included. Priced as neutral market with three plus competitive bids
- Budget quotes obtained for manholes, catch basins, RCP pipe, ductile iron pipe, and PVC pipe. All other pricing per database pricing
- Asphalt - \$125/ton subcontractor cost, aggregate - \$32.50/ton subcontractor cost
- Demoed asphalt hauled to recycle
- No special coating for manholes, catch basins, DI pipe, or RCP pipe included
- No special joints included for piping
- Import pipe bedding - \$9/ton plus \$10/ton delivery
- Flexible pipe bedding – 10” below to 1’ above with minimum of 1’ each side
- Rigid pipe bedding – 10” below to springline with minimum of 1’ each side
- Native backfill above import bedding. If import structural fill is required, will add significant cost for haul off and import
- Assumed slide rail support for deeper excavations and trench boxes for remainder
- Assumed well dewatering along section of high groundwater within trench sump pumps. Groundwater pumped to existing sewer/storm drain
- Allowances provided are identified

##### Storm Drain Improvements:

- Included bypass pumping
- Included tie ins to existing

##### Sanitary Sewer Improvements:

- Work performed with new storm drain work
- Included bypass pumping
- Included tie ins to existing

##### Water Main Improvements:

- Work performed with new storm drain work
- Included tie in of assumed existing services
- Included tie ins to existing
- Included temporary water system

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### Exclusions / Exceptions

The developed estimate excludes the following:

- Non-conventional environmental mitigation measures
- Non-conventional heritage and cultural mitigation measures
- All owner costs and owner's contingency such as but not limited to pre-construction activities, management and support of field construction activities, interest during construction, allowances for change orders and claims, engineering services during construction, and owner's contingency
- Removal of unforeseen underground obstructions
- Hazardous material remediation or disposal
- Utility costs for power connects or incoming transmission
- Permits beyond those normally needed for the type of project
- Facility O&M costs
- Special inspections and testing not listed
- CM fees
- Engineering Design Fees
- Geotechnical investigation

### 1.12 Allowances

The developed estimate includes the following allowances:

- As indicated in estimate

### 1.13 Project Risks / Opportunities

The following standard project risks can influence bid results:

- Specification requiring special phasing constraints
- Onerous contract terms and conditions



## **Attachment**

**Estimate Classification Matrix**

**Estimate Classification Descriptions**

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**Estimate Classification Matrix\***

<b>Estimate Class</b>	<b>LEVEL OF PROJECT DEFINITION</b> Expressed as % of Complete Project Definition	<b>END USAGE</b> Typical Purpose of Estimate	<b>METHODOLOGY</b> Typical Estimating Techniques	<b>EXPECTED ACCURACY RANGE</b> At 90% Confidence Level	<b>TYPICAL CONTINGENCY</b> To Achieve 50% Probability of Overrun/Underrun
<b>5</b>	<b>&lt;=5%</b>	<b>Preliminary Project Screening Estimate, Capital Budget OOM Estimate, Alternate Schemes Evaluation, Strategic Analysis</b>	<b>Capacity Factored, Parametric Models, Judgment, Analogy, Historical Project Comparison, Cost Unit Cost</b>	<b>Low: -20% to -50% High: +30% to +100%</b>	<b>15% to 40%</b>
<b>4</b>	<b>5% to 20%</b>	<b>Preliminary Project Estimate, Reality Check Estimate, Alternate Schemes Evaluation, Feasibility Study</b>	<b>Equipment Factored Parametric Models, Historical Relationship Factors, Broad Unit Cost Data</b>	<b>Low: -15% to -30% High: +20% to +50%</b>	<b>10% to 25%</b>
<b>3</b>	<b>20% to 60%</b>	<b>Project Funding Estimate, Fair Price Check Estimate, Alternate Schemes Evaluation</b>	<b>Semi-Detailed Unit Costs with Assembly Level Line Items by Trade, Historical Relationship Factors</b>	<b>Low: -10% to -20% High: +10% to +30%</b>	<b>5% to 15%</b>
<b>2</b>	<b>60% to 99%</b>	<b>Project Funding Estimate, Control Estimate, Bid Estimate</b>	<b>Detailed Estimating Data by Trade, with Detailed Takeoff Quantities</b>	<b>Low: -5% to -15% High: +5% to +20%</b>	<b>5% to 15% of unexpected funds</b>
<b>1</b>	<b>90% to 100%</b>	<b>Firm Bid Estimate</b>	<b>Detailed Estimating Data by Trade with Detailed Firm Takeoff Quantities</b>	<b>Low: -3% to -10% High: +3% to +15%</b>	<b>3% to 10% Of unexpected funds</b>

\*Note: Modified AACE International

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### Estimate Class Descriptions

**CLASS 5 Cost Estimate** – Class 5 estimates are generally prepared based on very limited information, and subsequently have wide accuracy ranges. Typically, engineering is from 2% to 10% complete. They are often prepared for strategic planning purposes, market studies, assessment of viability, project location studies, and long range capital planning. Virtually all Class 5 estimates use stochastic estimating methods such as cost curves, capacity factors, and other parametric techniques. Expected accuracy ranges are from –20% to –50% on the low side and +30% to 100% on the high side, depending on technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. As little as 1 hr. or less to perhaps more than 200 hours may be spent preparing the estimate based on the project and estimating methodology.

**CLASS 4 Cost Estimate** – Class 4 estimates are generally prepared based on limited information and subsequently have fairly wide accuracy ranges. Typically, engineering is 10% to 40% complete. They are typically used for project screening, determination of feasibility, concept evaluation, and preliminary budget approval. Virtually all Class 4 estimates use stochastic estimating methods such as cost curves, capacity factors, and other parametric and modeling techniques. Expected accuracy ranges are from –15% to –30% on the low side and +20% to 50% on the high side, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. Ranges could exceed those shown in unusual circumstances. As little as 20 hours or less to perhaps more than 300 hours may be spend preparing the estimate depending on the project and estimating methodology.

**CLASS 3 Cost Estimate** – Class 3 estimates are generally prepared to form the basis for budget authorization, appropriation, and/or funding. Typically engineering is from 10% to 40% complete, and would comprise a minimum of process flow diagrams, utility flow diagrams, preliminary piping and instrumentation diagrams, plot plan, developed layout drawings, and essentially complete engineered process and utility equipment lists. They are typically prepared to support full project funding requests, and become the first of the project phase "control estimates" against which all actual costs and resources will be monitored for variation to budget. Most Class 3 estimates involve more deterministic estimating methods than stochastic methods. Typical accuracy ranges for Class 3 estimates are from +/- 10% to 30% (sometimes higher), depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. As little as 300 hrs. or less to perhaps more than 2,000 hours may be spent preparing the estimate based on the project and estimating methodology.

**CLASS 2 Cost Estimate** – Class 2 estimates are generally prepared to form a detailed control baseline against which all project work is monitored in terms of cost and progress control. For contractors, this class of estimate is often used as the "bid" estimate to establish contract value. Typically, engineering is from 30% to 70% complete, and would comprise at a minimum of the following: process flow diagrams, utility flow diagrams, preliminary piping and instrumentation diagrams, heat and material balances, final plot plan, final layout drawings, complete engineered process and utility equipment lists, single line diagrams for electrical, electrical equipment, and motor schedules, vendor quotations, detailed project execution plans, resourcing and work force plans, etc. Class 2 estimates always involve a high degree of deterministic estimating methods often involving thousands of unit cost line items. Typical accuracy ranges for Class 2 estimates are –5% to –15% on the low side, and +5 to +20% on the high side, depending on the technological complexity of the project. As little as 300 hrs. or less to perhaps more than 3,000 hours may be spent preparing the estimate based on the project and estimating methodology. Bid estimates typically require more effort than estimates used for funding or control purposes.

**CLASS 1 Cost Estimate** – Class 1 estimates are generally prepared for discrete parts or sections of the total project rather than generating this level of detail for the entire project. These estimates may be prepared for to determine a fair price or bid check to evaluate claims and disputes. Typically engineering is 50% to 100% complete and would comprise of virtually all engineering and design documentation for the project and complete execution and commissioning plans. Expected accuracy ranges are –3% to –10% on the low side to +3% to + 15% on the high side depending on the technological complexity of the project, appropriate reference information and appropriate contingency determination. As little as 600 hours to more than 6,000 hours may be spent preparing the estimate based on the project and estimating methodology. Bid estimates typically require more effort than estimates used for funding or control purposes.

## **Attachment**

### **Detailed Cost Estimate**

**Opinion of Probable Construction Cost (AACE Class 3)****West Lynn Sewer Separation - Phases 4 & 5 60% Design**

Lynn Water &amp; Sewer Commission

Prepared by: Stantec Estimating Services

Revised: July 30, 2019

DESCRIPTION	ITEM COST	TOTAL COST
<b>Phases 4 &amp; 5 - Sewer Separation</b>		<b>\$ 17,560,000</b>
Mobilization / General Conditions	\$ 452,000	
Storm Drain Improvements	\$ 12,099,000	
Water Main Replacement/Relocation	\$ 2,871,000	
Sanitary Sewer Replacement	\$ 2,138,000	
<b>Allowances</b>		<b>\$ 4,248,000</b>
Soils Management + Disposal (incl. Hazardous)	\$ 2,638,000	
Utility/Agency Coordination	\$ 635,000	
Police Details	\$ 975,000	
<b>Contingency Less Allowances</b>	20%	<b>\$ 3,512,000</b>
<b>Escalation (3%/year)</b>	May-2023	<b>\$ 2,968,000</b>
<b>TOTAL - Phases 4 &amp; 5</b>		<b>\$ 28,288,000</b>

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